

U.S. Patent Application Serial No. 09/939,716
Amendment filed April 18, 2008
Reply to OA dated February 21, 2008

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-9 (canceled).

1 Claim 10 (currently amended): An optical transmitter comprising;
2 an input terminal for accepting an electrical binary signal,
3 an electrical-optical conversion means for converting an electrical signal to an optical signal,
4 an amplifier for amplifying an input signal applied to said input terminal to level requested
5 for operating said electrical-optical conversion means, and applying the amplified electrical signal
6 to said electrical-optical conversion means,
7 said electrical-optical conversion means having a traveling wave type electrode operating to
8 restrict bandwidth of an output light of said electrical-optical conversion means,
9 wherein
10 said electrical-optical conversion means is a Mach Zehnder light intensity modulator having
11 a traveling wave type electrode,
12 bandwidth of optical output of said Mach Zehnder light intensity modulator is restricted
13 because of loss of said traveling wave type electrode and by using mismatching of phase velocity of
14 electric wave propagating on said traveling wave type electrode and optical wave propagating in an

15 optical waveguide having refractive index depending upon electrical field generated by said electric
16 wave,

17 a precoding means is provided at an input stage of said amplifier,

18 said precoding means provides an output which is the same as the previous output when an
19 input binary digital signal is 0, and an output which differs from the previous output when an input
20 digital signal is 1, and

21 said traveling wave type electrode is designed so that phase change of optical wave
22 propagating in said optical waveguide depending upon said electrical field has waveforms of a
23 ternary duobinary signal.

1 Claim 11 (original): An optical transmitter according to claim 10, wherein said electrical-
2 optical conversion means provides the maximum level of optical output for an input electrical signal
3 having the maximum level and the minimum level, the minimum level of optical output for an input
4 electrical signal having middle level between said maximum level and said minimum level, and
5 optical phase relating to said maximum level of said optical signal is opposite of optical phase
6 relating to said minimum level of said optical signal.

1 Claim 12 (original): An optical transmitter according to claim 11, wherein said electrical-
2 optical conversion means is a Mach Zehnder light intensity modulator having a pair of electrodes,
3 each of which is a traveling wave type electrode having bandwidth restriction property, and electrical

4 signals applied to each electrodes are binary signals having opposite polarities with each other.

1 Claim 13 (previously presented): An optical transmitter according to claim 10, wherein
2 traveling direction of said electrical signal in said electrode is opposite to traveling direction of
3 optical signal in said optical waveguide.

1 Claim 14 (previously presented): An optical transmitter according to claim 10, wherein
2 said Mach Zehnder light intensity modulator is provided on a substrate of Z-cut Lithium-Niobate.

1 Claim 15 (previously presented): An optical transmitter according to claim 10, wherein
2 said Mach Zehnder light intensity modulator is provided on a substrate of X-cut Lithium-Niobate.

1 Claim 16 (previously presented): An optical transmitter according to claim 10, wherein
2 loss in said traveling wave type electrode at $f_0/2$ is always larger than loss at frequency higher than
3 $f_0/2$, where f_0 is clock frequency of said electrical binary signal.

1 Claim 17 (previously presented): An optical transmitter according to claim 10, wherein
2 modulation efficiency of said Mach Zehnder light intensity modulator at $f_0/2$ is always larger than
3 that at frequency higher than $f_0/2$, where f_0 is clock frequency of said electrical binary signal.

Claims 18-23 (canceled).

1 Claim 24: (new): An optical transmitter comprising:
2 an input terminal for accepting an electrical binary signal,
3 an electrical-optical conversion means for converting an electrical signal to an optical signal,
4 an amplifier for amplifying an input signal applied to said input terminal to level requested for
5 operating said electrical-optical conversion means, and applying the amplified electrical signal to
6 said electrical-optical conversion means,
7 said electrical-optical conversion means having a traveling wave type electrode operating to
8 restrict bandwidth of an output light of said electrical-optical conversion means,
9 wherein
10 said electrical-optical conversion means is a Mach Zehnder light intensity modulator having
11 a traveling wave type electrode,
12 bandwidth of optical output of said Mach Zehnder light intensity modulator is restricted
13 because of loss of said traveling wave type electrode,
14 a precoding means is provided at an input stage of said amplifier,
15 said precoding means provides an output which is the same as the previous output when an
16 input binary digital signal is 0, and an output which differs from the previous output when an input
17 digital signal is 1, and

U.S. Patent Application Serial No. **09/939,716**

Amendment filed April 18, 2008

Reply to OA dated February 21, 2008

18 said traveling wave type electrode is designed so that phase change of optical wave
19 propagating in said optical waveguide depending upon said electrical field has waveforms of a
20 ternary duobinary signal.

* * * *